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EXAMINER

CANTELMO, GREGG

ART UNIT PAPER NUMBER

1745

DATE MAILED: 11/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/670,384

Applicant(s)

IWANAGA ET AL.

Examiner

Gregg Cantelmo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 August 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. In response to the amendment received August 25, 2006:
 - a. Claims 1-8 are pending;
 - b. The previous 112 rejections have been withdrawn in light of the amendment;
 - c. The previous prior art rejections of record stand as modified. The changes to the rejection being necessitated by the amendments to the claims.Therefore this action is FINAL.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

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the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1, 3 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 2002-025611 A (JP '611) in view of U.S. Patent No. 6,632,572 (Takahashi) and either JP 2002-298909 (JP '909), JP 2002-110229 (JP' 229) or JP 2002-050398 (JP '398).

JP '611 discloses of a non-aqueous electrolyte secondary cell comprising a positive electrode intercalating and deintercalating lithium ions, a negative electrode intercalating and deintercalating lithium ions, and a non-aqueous electrolyte having a non-aqueous solvent and an electrolyte salt, wherein, the non-aqueous electrolyte includes a vinylene carbonate compound and a cyclic sulfite compound (abstract).

A total mass of the non-aqueous solvent and the electrolyte salt is taken as 100, an amount of the vinylene carbonate compound is 0.5 to 3 parts by mass per 100 total mass of the non-aqueous solvent and the electrolyte salt; and an amount of the cyclic sulfite compound is 0.1 to 2 parts by mass per 100 total mass of the non-aqueous solvent and the electrolyte salt (abstract and examples as applied to claim 3).

The vinylene carbonate compound is vinylene carbonate and ethylene sulfite is the cyclic sulfite compound (abstract as applied to claim 7).

The differences between claims 1 and 7 and JP '611 are that JP '611 does not teach of the casing structure and explosion-proof valve or of the electrolyte further including a phenylcycloalkane compound, or an alkylbenzene compound having a quaternary carbon directly bonded to a benzene ring (claim 1), of the phenylcycloalkane compound is at least one selected from the group consisting of phenylcyclohexane, phenylcycloheptane, and phenylcyclopentane; and the alkylbenzene compound is at least one selected from the group consisting of tert-butylbenzene, tert-amylbenzene, and tert-hexylbenzene (claim 7).

With respect to the casing structure and explosion proof valve:

Takahashi discloses that the same claimed casing and explosion proof valve is known in the art (abstract and Figs. 1 and 2).

The motivation for using this structure in a lithium battery is to improve the battery safety.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '611 by employing the casing and explosion-proof valve of Takahashi since it would have improved the battery safety.

With respect to the electrolyte further including a phenylcycloalkane compound, or an alkylbenzene compound having a quaternary carbon directly bonded to a benzene ring:

Each of JP '909 and JP '229 discloses adding tert-alkylbenzene compounds to a lithium battery nonaqueous electrolyte (abstract as applied to claims 1 and 7).

The motivation for adding this compound to the nonaqueous electrolyte is that it improves the cycling and discharge capacity of the electrochemical cell.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '611 by adding tert-alkylbenzene compounds to a lithium battery nonaqueous electrolyte as taught by either JP '909 or JP '229 since it would have improved the cycling and discharge capacity of the electrochemical cell.

JP '398 discloses adding phenylcyclohexane to a lithium battery nonaqueous electrolyte (abstract as applied to claim 1 and 7).

The motivation for adding phenylcyclohexane to the nonaqueous electrolyte is that it improves the safety and reliability of the battery and prevents overcharging of the cell.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '611 by adding phenylcyclohexane to the nonaqueous electrolyte as taught by JP '398 since it would have improved the safety and reliability of the battery and prevented overcharging of the cell.

4. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP '611 in view of Takahashi and either JP '909, JP '229 or JP '398 as applied to claim 1 above, and further in view of U.S. Patent No. 6,818,351 (Sunagawa).

JP '611 is drawn to lithium secondary batteries and employs lithium cobalt oxide positive electrode materials.

The difference not yet discussed is of the lithium cobalt oxide positive electrode material having a bulk density of 3.3 g/cm³ or more.

Sunagawa discloses using lithium cobalt oxide materials having a bulk density above 3.3 g/cm³ (abstract).

The motivation for using lithium cobalt oxide materials having a high bulk density is that it has improved load characteristics (abstract).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '611 by using lithium cobalt oxide materials having a high bulk density since it would have provided a battery having improved load characteristics.

5. Claims 4, 6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 2002-025611 A (JP '611) in view of Takahashi, JP 2002-050398 (JP '398) and either JP 2002-298909 (JP '909) or JP 2002-110229 (JP '229).

JP '611 discloses of a non-aqueous electrolyte secondary cell comprising a positive electrode intercalating and deintercalating lithium ions, a negative electrode intercalating and deintercalating lithium ions, and a non-aqueous electrolyte having a non-aqueous solvent and an electrolyte salt, wherein, the non-aqueous electrolyte includes a vinylene carbonate compound and a cyclic sulfite compound (abstract).

A total mass of the non-aqueous solvent and the electrolyte salt is taken as 100, an amount of the vinylene carbonate compound is 0.5 to 3 parts by mass per 100 total mass of the non-aqueous solvent and the electrolyte salt; and an amount of the cyclic

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sulfite compound is 0.1 to 2 parts by mass per 100 total mass of the non-aqueous solvent and the electrolyte salt (abstract and examples as applied to claim 3).

The vinylene carbonate compound is vinylene carbonate and ethylene sulfite is the cyclic sulfite compound (abstract as applied to claim 7).

The differences between claims 4 and 8 and JP '611 are that JP '611 does not teach of does not teach of the casing structure and explosion-proof valve or the electrolyte further including a phenylcycloalkane compound and an alkylbenzene compound having a quaternary carbon directly bonded to a benzene ring (claim 4); or the phenylcycloalkane compound is at least one selected from the group consisting of phenylcyclohexane, phenylcycloheptane, and phenylcyclopentane; and the alkylbenzene compound is at least one selected from the group consisting of tert-butylbenzene, tert-amylbenzene, and tert-hexylbenzene (claim 8).

With respect to the casing structure and explosion proof valve:

Takahashi discloses that the same claimed casing and explosion proof valve is known in the art (abstract and Figs. 1 and 2).

The motivation for using this structure in a lithium battery is to improve the battery safety.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '611 by employing the casing and explosion-proof valve of Takahashi since it would have improved the battery safety.

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With respect to the electrolyte further including a phenylcycloalkane compound and an alkylbenzene compound having a quaternary carbon directly bonded to a benzene ring:

Each of JP '229 and JP '909 discloses adding tert-alkylbenzene compounds to a lithium battery nonaqueous electrolyte (abstract as applied to claims 4 and 8).

The motivation for adding this compound to the nonaqueous electrolyte is that it improves the cycling and discharge capacity of the electrochemical cell.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '611 by adding tert-alkylbenzene compounds to a lithium battery nonaqueous electrolyte as taught by either JP '229 or JP '909 since it would have improved the cycling and discharge capacity of the electrochemical cell.

JP '398 discloses adding phenylcyclohexane to a lithium battery nonaqueous electrolyte (abstract as applied to claims 4 and 8).

The motivation for adding phenylcyclohexane to the nonaqueous electrolyte is that it improves the safety and reliability of the battery and prevents overcharging of the cell.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '611 by adding phenylcyclohexane to the nonaqueous electrolyte as taught by JP '398 since it would have improved the safety and reliability of the battery and prevented overcharging of the cell.

6. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP '611 in view of Takahashi, JP '398 and either JP '909 or JP '229 as applied to claim 4 above, and further in view of U.S. Patent No. 6,818,351 (Sunagawa).

JP '611 is drawn to lithium secondary batteries and employs lithium cobalt oxide positive electrode materials.

The difference not yet discussed is of the lithium cobalt oxide positive electrode material having a bulk density of 3.3 g/cm³ or more.

Sunagawa discloses using lithium cobalt oxide materials having a bulk density above 3.3 g/cm³ (abstract).

The motivation for using lithium cobalt oxide materials having a high bulk density is that it has improved load characteristics (abstract).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '611 by using lithium cobalt oxide materials having a high bulk density since it would have provided a battery having improved load characteristics.

Response to Arguments

7. Applicant's arguments with respect to claims 1-8 have been considered but are moot in view of the new ground(s) of rejection.

Applicant states that JP'611 discloses a non-aqueous electrolyte secondary cell having vinylene carbonate and cyclic sulfite. However, JP '611 does not disclose a phenylcycloalkane compound having a quaternary carbon directly bonded to a benzene ring, or an alkylbenzene compound having a quaternary carbon directly bonded to a

benzene ring. Further, JP '611 does not disclose "an explosion-proof valve mounted in the sealing structure, wherein the explosion-proof valve is capable of separating from the sealing plate to discontinue current when the internal cell pressure exceeds a predetermined value."

As evident from the rejections of record, it is agreed that the primary reference fails to teach of these claimed features. It is further evident that the secondary references relied upon in the rejections of record reasonably obviate the claimed invention for the reasons set forth above.

Applicant asserts that since the teachings of JP '611 do not include explosion-proof valves, JP '611 is not for the purpose of solving the technical problem of "prevention of unnecessary operation of the current-cutting device", is not for the purpose of solving the technical problem "prevention of solution leakage when the cell temperature is high (100°C or more)," and does not teach or disclose the purpose of solving the technical problem of "inhibition of degradation of cycle characteristics occurring when the bulk density of the active material is increased in order to increase cell capacity", then JP '611 does not solve the same technical problems as that of the instant application.

This argument is not persuasive for the following reasons. First the claimed invention does not clearly require or address these specific problems and thus are not expressly germane to the invention as claimed. Second, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would

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otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). Third, and most significantly, it is held that the prior art rejections of record reasonably teach, suggest and therefore render obvious the claimed invention. Therefore the rejection stands.

Applicant makes similar arguments to the secondary references relied upon in the prior art rejection of record. For the purposes of brevity, these arguments are not persuasive for the same reasons discussed above with respect to JP '611.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregg Cantelmo whose telephone number is 571-272-1283. The examiner can normally be reached on Monday to Thursday, 8:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



gc

November 12, 2006

Gregg Cantelmo
Primary Examiner
Art Unit 1745